

Two New Species and Genera of Aeolid Nudibranchs from the Tropical Eastern Pacific

by

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Abstract. Specimens of two new species of aeolid nudibranchs, *Hermosita sangria* and *Bajaeolis bertschi*, are described from the tropical eastern Pacific Ocean. Both species are placed in new genera, *Hermosita* and *Bajaeolis*, within the Facelinidae, as aspects of their external and internal morphology differ from members of closely allied genera.

INTRODUCTION

COLLECTIONS made from the Pacific and Gulf of California coasts of Baja California and from the Pacific coast of Panama have yielded specimens of two undescribed species of aeolidacean nudibranchs. This paper describes the morphology of these new taxa and discusses their systematic placement within the Aeolidacea.

Family FACELINIDAE
Subfamily FAVORININAE

Hermosita Gosliner & Behrens, gen. nov.

Diagnosis: Body elongate, limaciform. Foot corners tentacular. Rhinophores perfoliate. Cerata arranged in arches with a single row per arch. Anus cleioproctic. Nephroproct interhepatic. Salivary and oral glands simple and elongate. Masticatory border of jaws smooth. Radula uniseriate with cuspidate rachidian teeth. Central cusp of rachidian wide, with slender adjacent denticles. Reproductive system with proximal receptaculum seminis and distal bursa copulatrix. Penis simple with small, fleshy papilla on one side of apex.

Type species: *Hermosita sangria*, spec. nov.

Etymology: *Hermosita* means "beautiful little one" in Spanish.

Hermosita sangria Gosliner & Behrens, spec. nov.

(Figures 1A, 2-5A, 6; Table 1)

Coryphella sp.: BEHRENS, 1980:105, fig. 155.

Type material: Holotype: California Academy of Sciences, CASIZ 059586, approximately 52 mm (preserved), collected in 17 m of water, 0.75 km S. of Isla San Benito Oeste, Baja California, Mexico (28°20'N, 116°10'W), 31 August 1982, by Florence McAlary.

Paratypes: (1.) One specimen, CASIZ 059587, 16 mm (preserved), collected in 13 m of water, Punta San Augustino, Isla Cedros, Baja California, Mexico (28°5'N, 115°21'W), 29 August 1982, by Daniel W. Gotshall. (2.) Four specimens, CASIZ 059588, Isla San Benito, collected by James Gatewood and Marc Chamberlain. (3.) Three specimens, Division of Mollusks, National Museum of Natural History, U.S.N.M. 635838, collected with egg masses, 3-m depth, Bahía Magdalena, Baja California Sur, 30 May 1958, by Conrad Limbaugh.

Etymology: The specific epithet, *sangria*, refers to the blood red pigment present on the head, rhinophores, and cerata of this species.

Description

External morphology: The living animals (Figures 1A, 2) may reach 70 mm in length. The body is elongate and



Figure 1

Living animals. A. *Hermosita sangria*, spec. nov., specimen collected from Isla San Benito, Aug. 1984. Photo by James Gatewood. B. *Bajaeolis bertschi*, spec. nov., 27-mm specimen collected from Bahía de los Angeles, 15-m depth, Oct. 1979. Photo by Jeff Hamann.

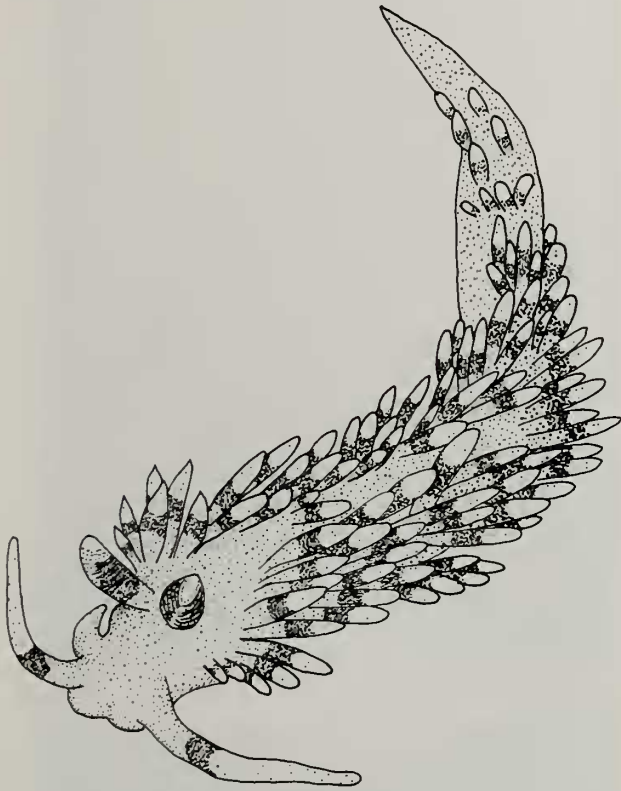


Figure 2

Hermosita sangria, spec. nov. Living animal drawn from color transparency.

graceful. The foot is wide, approximately twice the width of the notum, and tapers posteriorly to a rounded tail. The perfoliate rhinophores possess 16–22 lamellae. The oral tentacles are elongate with pointed apices. The foot corners (Figures 2, 3A) are tentacular, about $\frac{1}{3}$ – $\frac{1}{2}$ of the length of the oral tentacles. The slightly clavate cerata (Figure 3B) are semicircular in cross-section, with a flattened dorsal surface. The cavity of each ceras contains nodular digestive gland cells and terminates at an elongate, apical cnidosac. The cerata are arranged in about 8 horseshoe-shaped arches, with a single row of cerata per arch (Figure 3A). In one specimen the ceratal formula was I-17, II-16, III-16, IV-12, V-12, VI-9, VII-6, VIII-3–4. The cerata at either end of each arch are shortest while the longest are most central. The anus is cleioproctic (Figure 3A), located within the second ceratal arch (the first arch of the right posterior digestive branch). The nephroproct is situated between the first two ceratal groups, within the interhepatic space. The gonopores are located on the right side of the body, ventral to the anterior half of the first ceratal arch.

The ground color of the body is violet, which deepens to a rich vermilion red band near the middle of the cerata, foot corners, oral tentacles and rhinophores. The distal

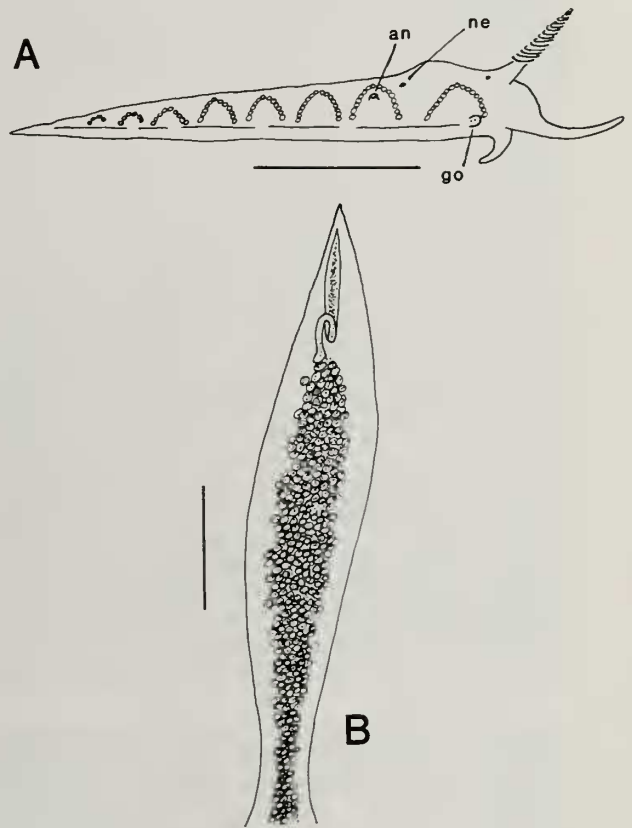


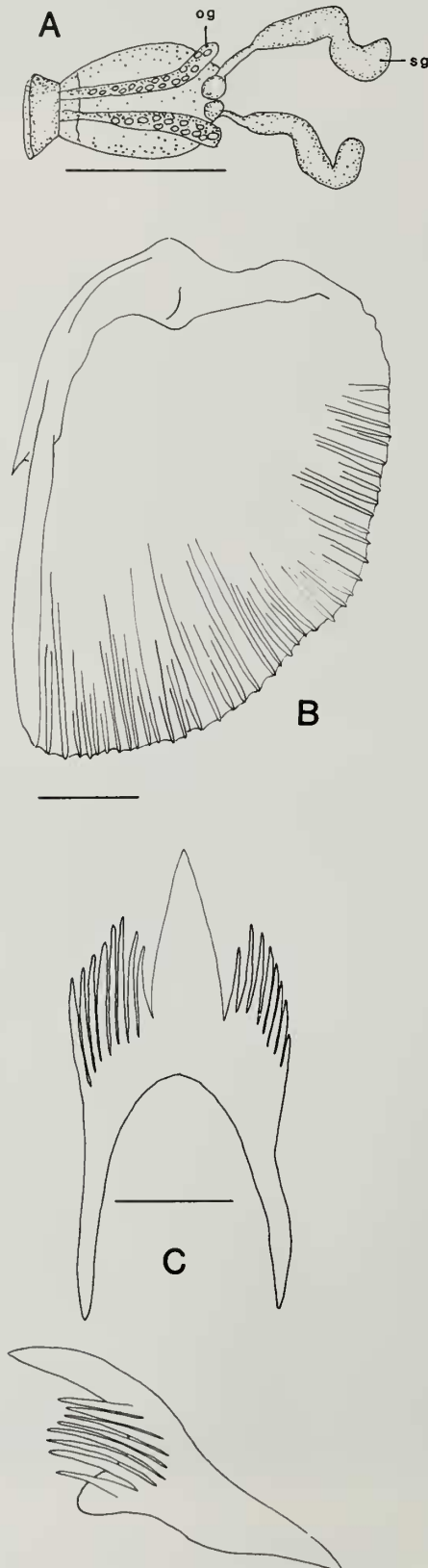
Figure 3

Hermosita sangria, spec. nov. A. Lateral view, scale = 25 mm. an = anus; go = genital orifice; ne = nephroproct. B. Detail of ceras, scale = 2.0 mm.

third of these structures is tipped with yellow, or white in some specimens.

Digestive system: The buccal mass is thick and muscular (Figure 4A). The oral glands are simple and clavate. The salivary glands are unbranched and slightly convoluted. The thick, rectangular jaws (Figure 4B) are gold in color and deeply concave. Their masticatory border is smooth, devoid of denticles. The radular formula is 26–30 \times 0.1.0. The radular teeth (Figures 4C, 5A) are thin and elongate. On either side of the prominent, triangular central cusps are 9–15 elongate, slender denticles.

Reproductive system: The reproductive system (Figure 6A) is androdiaulic. The ovotestis contains abundant diffuse acini, which empty into the short, narrow preampullary duct. The preampullary duct expands into the muscular, slightly convoluted ampulla. The ampulla narrows again to the junction of the oviduct, vas deferens, and the duct of the receptaculum seminis. The vas deferens is exceedingly short and expands abruptly into the penis. There is no distinct prostatic portion of the vas deferens, although the penis itself is lined with elongate



prostatic cells (Figure 6B). The penis empties into a separate male gonopore. On one side of the penis is a distinct fleshy papilla that was present in all specimens examined. The receptaculum seminis is lobate and irregular in outline. It inserts into the common junction by means of an elongate stalk. The oviduct is short and enters the granular albumen gland. The membrane gland consists of several distinct folds. The mucous gland comprises the bulk of the genital mass and consists of two distinct lobes that differ slightly in their color and texture. Adjacent to the female gonopore, and joining with it, is the spherical bursa copulatrix.

Egg mass: The egg mass is highly convoluted and is closely appressed to the central axis of the hydroid prey of the adults. There is a single egg per capsule.

Natural history: *Hermosita sangria* has been found exclusively on the gorgonian-like hydroid *Solanderia* sp. in a depth of 3–17 m. It is known only from the Pacific coast of Baja California, from Isla Cedros to Bahía Magdalena.

Systematic Placement of *Hermosita sangria*

Hermosita sangria is clearly placed in the Facelinidae, as the anus is cleioproctic and the uniseriate radula bears cuspidate teeth. By virtue of the fact that *Hermosita* has all cerata groups arranged in simple arches, it is considered as a member of the subfamily Favorininae, following EDMUNDS (1970) and GOSLINER (1980). *Hermosita sangria* is the only favorinid with a distal bursa copulatrix and a proximal, semi-serial receptaculum seminis. *Hermosita* is morphologically similar to members of several aeolidacean genera. Its systematic relationship to these genera requires a discussion of ancestral and derived features within the suborder.

Among the Aeolidacea, possession of a proximal receptaculum seminis and a distal bursa copulatrix represents the probable plesiomorphic (ancestral) state. This configuration is the more common condition in members of the Flabellinidae, which also possess a triseriate radula and a pleuroproctic anus (also plesiomorphic states). In more modified aeolidaceans, which have a uniseriate radula, there is usually a single, sperm storage organ, either a receptaculum or a bursa, but not both. There are a few notable exceptions to this general trend. *Noumeaella africana* (EDMUNDS, 1970), *Antonietta luteorufa* (SCHMEKEL, 1966), *Dicata odhneri* (SCHMEKEL, 1967), *Cuthona divae* (MACFARLAND, 1966, as *C. rosea*), *C. concinna* (WILLIAMS & GOSLINER, 1979), and *Babakina caprinsulensis* (MIL-

Figure 4

Hermosita sangria, spec. nov. A. Buccal mass, scale = 2.0 mm. og = oral gland; sg = salivary gland. B. Jaw. C. Radula, scale = 80 μ m.



Figure 5

Scanning electron micrographs. A. *Hermosita sangria*, spec. nov. Radula, $\times 500$. B-D. *Bajaeolis bertschi*, spec. nov. B. Jaw, $\times 80$. C. Masticatory border, $\times 1000$. D. Radula, $\times 500$.

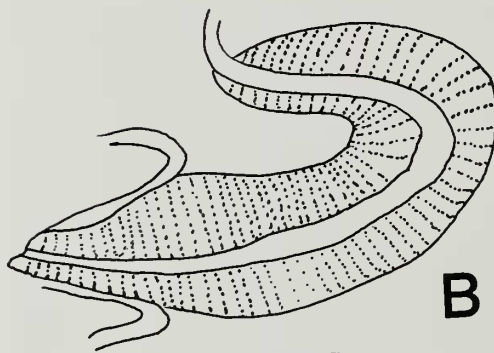
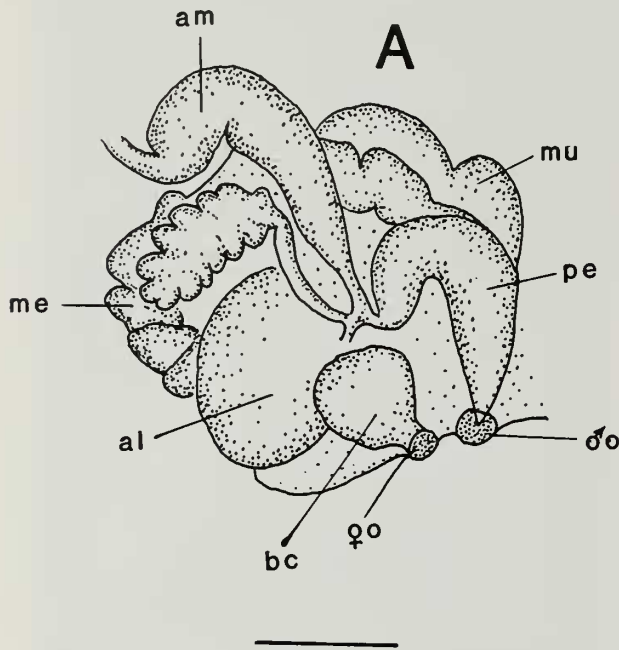


Figure 6

Hermosita sangria, spec. nov. A. Reproductive system, scale = 1.0 mm. al = albumen gland; am = ampulla; bc = bursa copulatrix; me = membrane gland; mu = mucous gland; od = oviduct; pe = penis; rs = receptaculum seminis; ♀o = female orifice; ♂o = male orifice. B. Penis and vas deferens, scale = 0.5 mm.

LER, 1974) all possess a uniseriate radula, but have a receptaculum and a bursa. Of these, *Babakina* has a pleuroproct anus, a prominent notal brim, cerata arranged in poorly defined rows, and numerous rows of denticles on the masticatory border of the jaw. GOSLINER (1980) has stated that *Babakina* is allied to the Flabellinidae on the basis of the presence of numerous primitive features. The only apomorphy (derived feature) it possesses is a uniseriate radula. This warrants maintenance of its placement as a separate family, but in no way suggests affinities

to the Facelinidae. *Cuthona divae* and *C. concinna* possess an acleioproct anus and a penis with an elongate penial gland, unique derived features within the Eubranichidae and Tergipedidae. The three remaining taxa are members of the Facelinidae and are compared to *Hermosita* in more detail (Table 1). In all three of these taxa the receptaculum seminis is serial, the prostate is elongate, and the radular teeth have triangular denticles. In *Hermosita* the receptaculum is semi-serial, there is no distinct prostate (prostatic cells are contained in the penis [Figure 6B]), and the radular teeth bear thin, elongate denticles (as in *Herviella*). *Hermosita* is also unique in possessing a penis with an eccentric fleshy papilla.

Of sympatric aeolids, *Hermosita sangria* bears a strong external resemblance to *Flabellina iodinea* (Cooper, 1863). The two species have similar coloration, perfoliate rhinophores, and tentacular foot corners. However, in *F. iodinea* the anus is pleuroproct, the ceratal groups are elevated on notal cushions, the radula is triseriate, with numerous triangular denticles on the rachidian teeth, and there are several rows of denticles along the surface of the masticatory border.

Family FACELINIDAE
Subfamily FAVORININAE

Bajaeolis Gosliner & Behrens, gen. nov.

Diagnosis: Body elongate, limaciform. Foot corners tentacular. Rhinophores perfoliate. Cerata arranged on pedunculate arches with two rows per arch. Anus cleioproct. Nephroproct interhepatic. Salivary glands simple, oral glands highly dendritic. Masticatory border of jaw elongate with several rows of denticles. Radula uniseriate with broad, cuspidate rachidian teeth. Central cusp of rachidian small. Adjacent denticles short, triangular. Reproductive system triaualic with proximal receptaculum seminis. Penis simple, unarmed.

Type species: *Bajaeolis bertschi*, spec. nov.

Etymology: *Bajaeolis* is named for the Baja California Peninsula.

Bajaeolis bertschi Gosliner & Behrens, spec. nov.

(Figures 1B, 5B–D, 7–11; Table 2)

Type material: Holotype: California Academy of Sciences, CASIZ 059589, approximately 40 mm in life, collected in 10 m of water, off Punta La Gringa, Bahía de los Angeles, Baja California, Mexico, 6 October 1984, by Terrence M. Gosliner.

Paratypes: (1.) Three specimens, CASIZ 059590, collected in 10 m of water, off Punta La Gringa, Bahía de los Angeles, Baja California, Mexico, 6 October 1984, by Terrence M. Gosliner. (2.) One specimen, CASIZ 059591, S. end of Isla Coronado, Bahía de los Angeles, Baja California, Mexico, 2 October 1984, by Hans Bertsch. (3.)

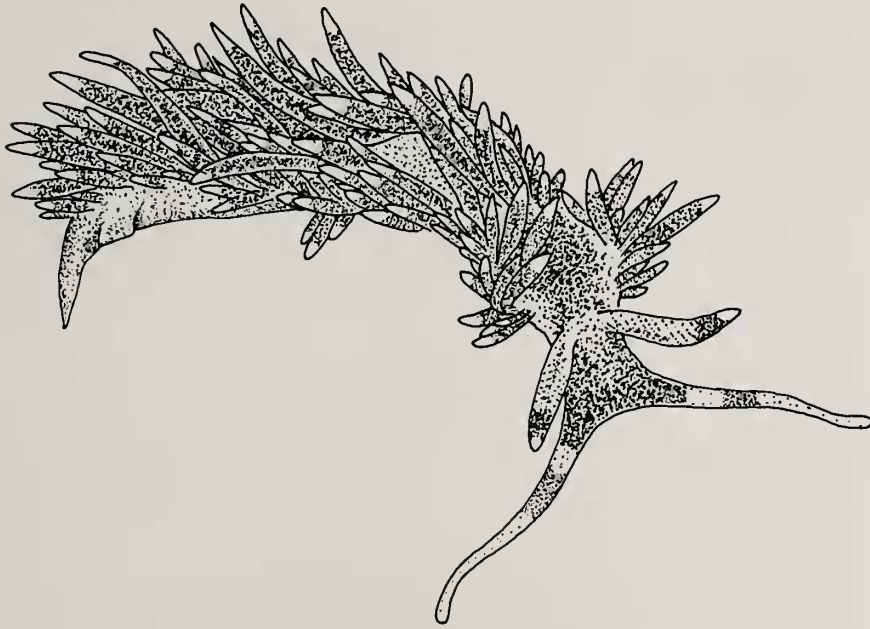


Figure 7

Bajaolis bertschi, spec. nov. Living animal drawn from color transparency.

Two specimens, CASIZ 059592, Islas Perlas, Bahía de Panama, Panama, June 1982, by Jeff Hamann.

Etymology: *Bajaolis bertschi* is named after our good friend and colleague, Hans Bertsch, in recognition of his contributions to the knowledge of the opisthobranch fauna of the Gulf of California.

Description

External morphology: The living animals (Figures 1B, 7) reach 40 mm in length. The body is elongate and grace-

ful. The foot is approximately equal in width to the notum and tapers posteriorly to a slightly rounded end. The rhinophores are perfoliate with 18–25 lamellae. The oral tentacles are elongate and taper to an acute apex. The foot corners (Figure 8A) are long and tentacular, $\frac{1}{3}$ – $\frac{1}{2}$ the length of the oral tentacles. The cerata are cylindrical but slightly tapered. They contain diffuse digestive gland tissue and an apical cnidosac. The cerata (Figure 8B) are arranged in 6 undulating arches per side, with a double row of cerata per arch, in all specimens observed. There is a prominent notal brim that is interrupted between the

Table 1

Comparison of *Hermosita* with other aeolid genera.

Genus	Rhinophores	Anterior ceratal cluster	Masticatory border	Vas deferens	Receptaculum seminis	Denticles of radular tooth	Penis
<i>Antoniotta</i>	Smooth	Several rows	Smooth	Elongate, prostatic, and ejaculatory	Serial	Triangular	Simple conical, unarmed
<i>Dicata</i>	Smooth	Arch	Smooth	Elongate, prostatic, and ejaculatory	Serial	Triangular	Simple conical, unarmed
<i>Hermosita</i>	Perfoliate	Arch	Smooth	Short	Semi-serial	Elongate	Simple with fleshy papilla
<i>Noumeaella</i>	Papillate	Arch	Denticulate	Elongate, prostatic, and ejaculatory	Serial	Triangular	Armed with stylet

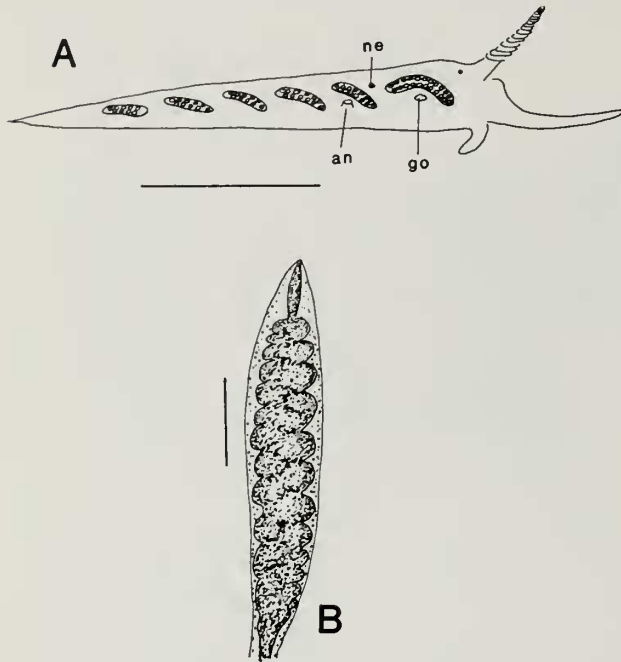


Figure 8

Bajaeolis bertschi, spec. nov. A. Lateral view, scale = 10 mm. an = anus; go = genital orifice; ne = nephroproct. B. Detail of ceras, scale = 1.0 mm.

first and second arch. Within each arch the length of the cerata increases towards its center. In one specimen the cerata formula is: I-17, II-16, III-10, IV-10, V-10, VI-8-10. There may be as many as 29 cerata in the anteriormost arch. The anus is cleioproct, located on the right side of the body, ventral to the center of the second ceratal arch. The nephroproct is located ventral to the center of the interhepatic space. The genital apertures are located within the anterior half of the first ceratal arch.

The ground color is whitish yellow, becoming red mid-dorsally. The head, notum, and cerata are covered by opaque white spots. Just below the apex of each ceras, these spots are more densely concentrated. The central core of the cerata is deep vermilion. The apex of each ceras is translucent and the white cnidosac is visible through it. The oral tentacles are a light purple. There is a darker purple or reddish band near the middle, or occasionally at the base, of the oral tentacles and subapically on the rhinophores.

Digestive system: The buccal mass is muscular (Figure 9A). The oral glands are complex, highly dendritic structures. There is a major bifurcation of each gland near the posterior limit of the buccal mass. The salivary glands are simple and clavate. The jaws (Figures 5B, 9B) are thin and rectangular with an elongate masticatory border that runs most of the length of the jaws. The masticatory border (Figure 5C) bears four or five rows of denticles each

Table 2

Comparison of *Bajaeolis* with other aeolid genera.

Genus	Rhinophores	Cerata	Masticatory border	Radula	Penis	Nephroproct	Oral glands
<i>Favorinus</i>	Smooth, with bulbous swellings or annulate	Single row per arch	Several rows of denticles	With prominent central cusp	Simple, un-armed or with stylet	Interhepatic	Absent
<i>Jason</i>	Papillate	Double row per arch. Cerata on peduncles	Smooth	Vestigial	With internal glands	Interhepatic	Simple
<i>Dondice</i>	Annulate	Double row per arch. Cerata on peduncles	Single row of denticles	With prominent central cusp	With large internal gland	Interhepatic	Absent
<i>Pteraeolidia</i>	Perfoliate	Double row anteriorly; single row posteriorly. Cerata on peduncles	Several rows of denticles	With small central cusp	With rows of conical papillae	In 2nd arch adjacent to anus	Simple
<i>Bajaeolis</i>	Perfoliate	Double row per arch. Cerata on peduncles	Several rows of denticles	With small central cusp	Simple, un-armed	Interhepatic	Dendritic
<i>Facalana</i>	Perfoliate	Double row per arch. Cerata on peduncles	"Glaucus-like" single row of denticles	With small central cusp	Leaf-like with glands along edge	?	?

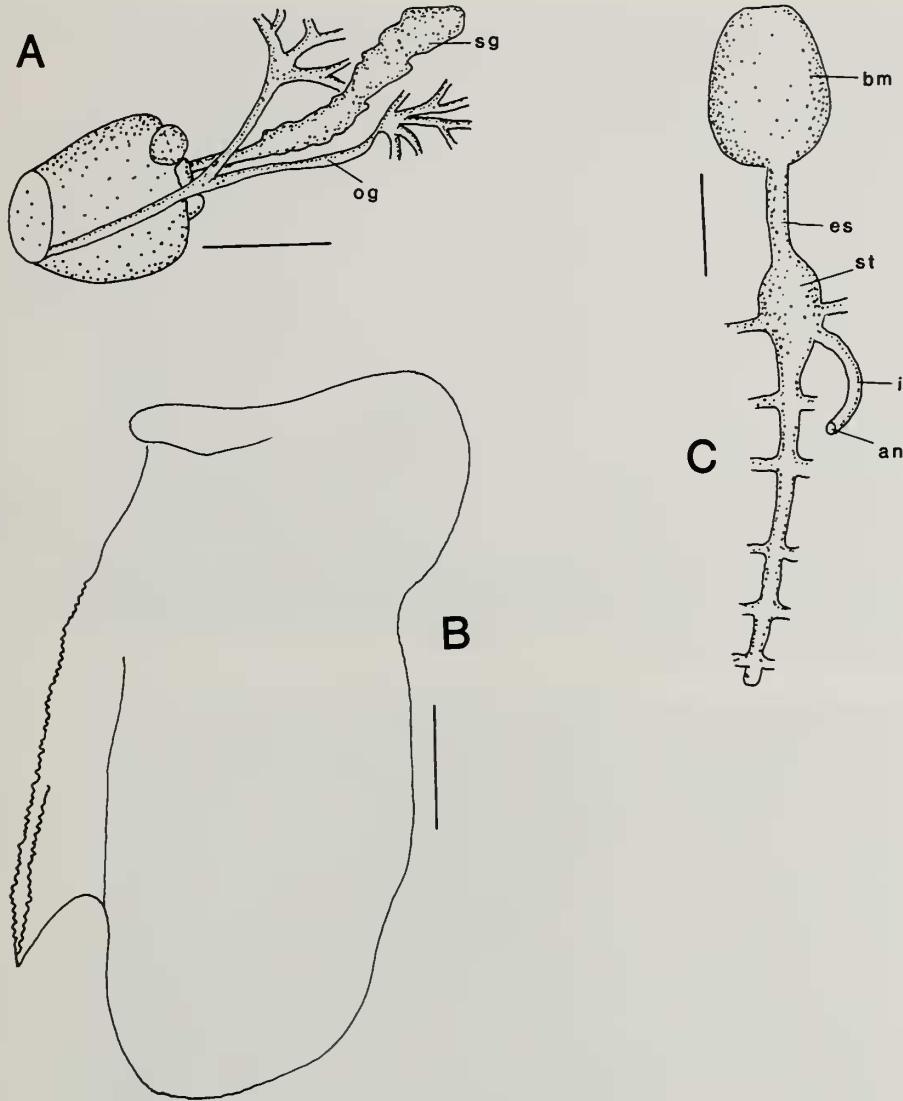


Figure 9

Bajaeolis bertschi, spec. nov. A. Buccal mass, scale = 1.0 mm. og = oral gland; sg = salivary gland. B. Jaw, scale = 0.25 mm. C. Branching of digestive system, scale = 4.0 mm. an = anus; bm = buccal mass; es = esophagus; i = intestine; st = stomach.

with 55–78 teeth. The radular formula is $13-15 \times 0.1.0$. The radular teeth (Figures 5D, 10) have a thick basal portion and possess 12–16 short, triangular denticles on either side of the short central cusp. There is a single digestive branch giving rise to each of the ceratal arches (Figure 9C).

Reproductive system: The reproductive system (Figure 11A) is essentially triaulic, with separate nidamental, vaginal, and penial pores. The ampulla is undulate and elongate. It branches into the vas deferens and the oviduct.

The vas deferens is prostatic with no distinct division between it and the penis. The penial papilla is conical and unarmed, without associated glands. The receptaculum seminis is bilobed in one specimen and undivided in a second specimen. Its elongate duct joins the oviduct, branches to the female gland mass, and continues to form the vagina. The albumen gland is granular and folded. The membrane gland consists of several lobes. The mucous gland comprises the bulk of the genital mass and consists of three distinct lobes.

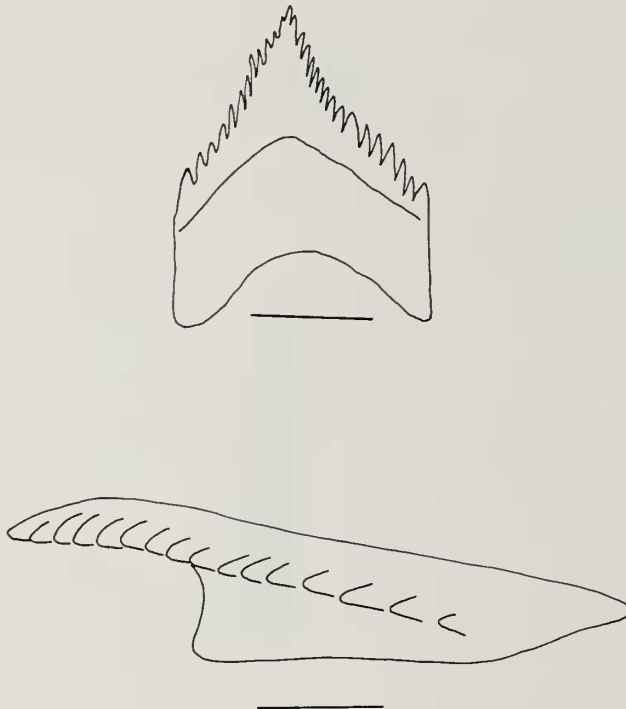


Figure 10

Bajaeolis bertschi, spec. nov. Radula. *Top*. Dorsal view, scale = 60 μ m. *Bottom*. Lateral view, scale = 30 μ m.

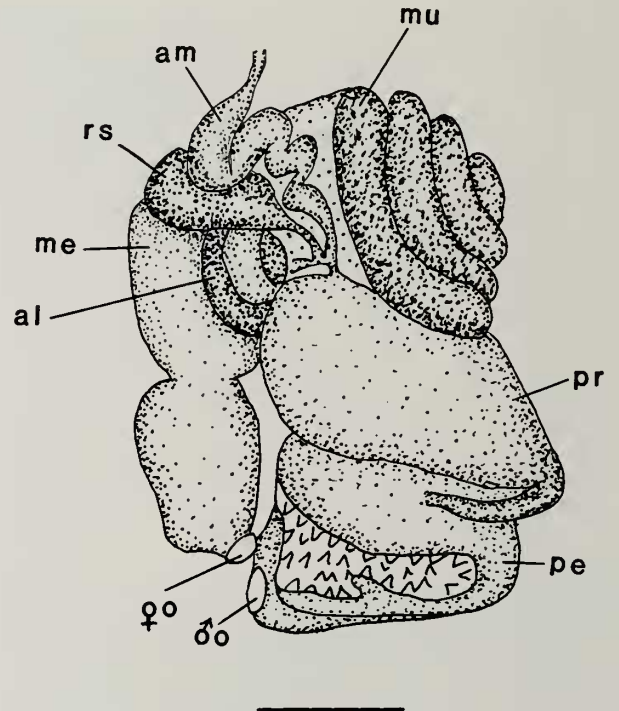


Figure 12

Pteraeolidia ianthina (Angas, 1864). Reproductive system, scale = 2.0 mm. al = albumen gland; am = ampulla; me = membrane gland; mu = mucous gland; pe = penis; pr = prostate; rs = receptaculum seminis; ♀ = female orifice; ♂ = male orifice.

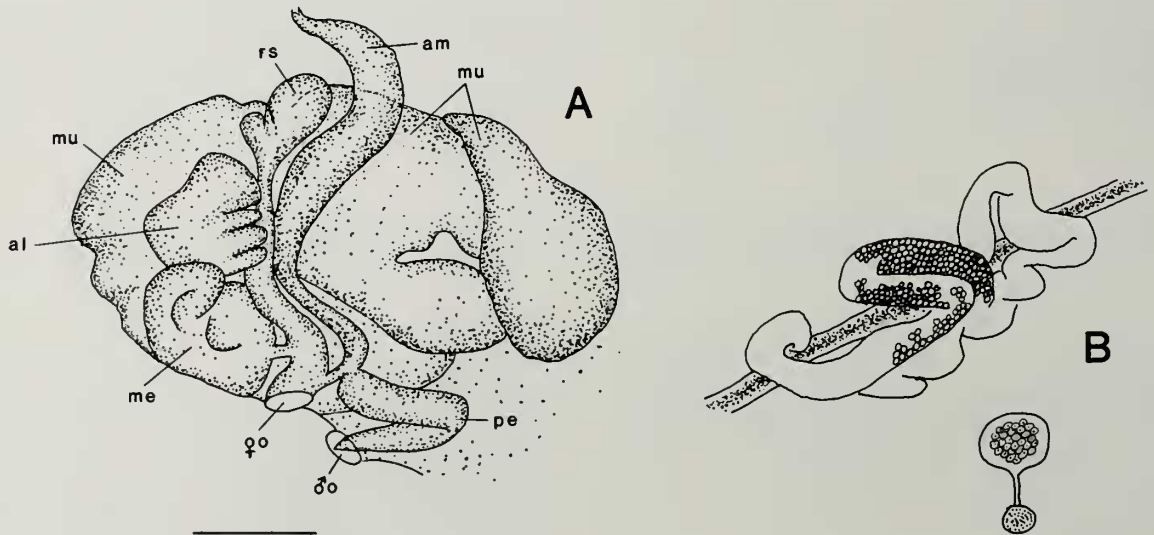


Figure 11

Bajaeolis bertschi, spec. nov. A. Reproductive system, scale = 1.0 mm. al = albumen gland; am = ampulla; me = membrane gland; mu = mucous gland; pe = penis; rs = receptaculum seminis; ♀ = female orifice; ♂ = male orifice. B. Egg mass.

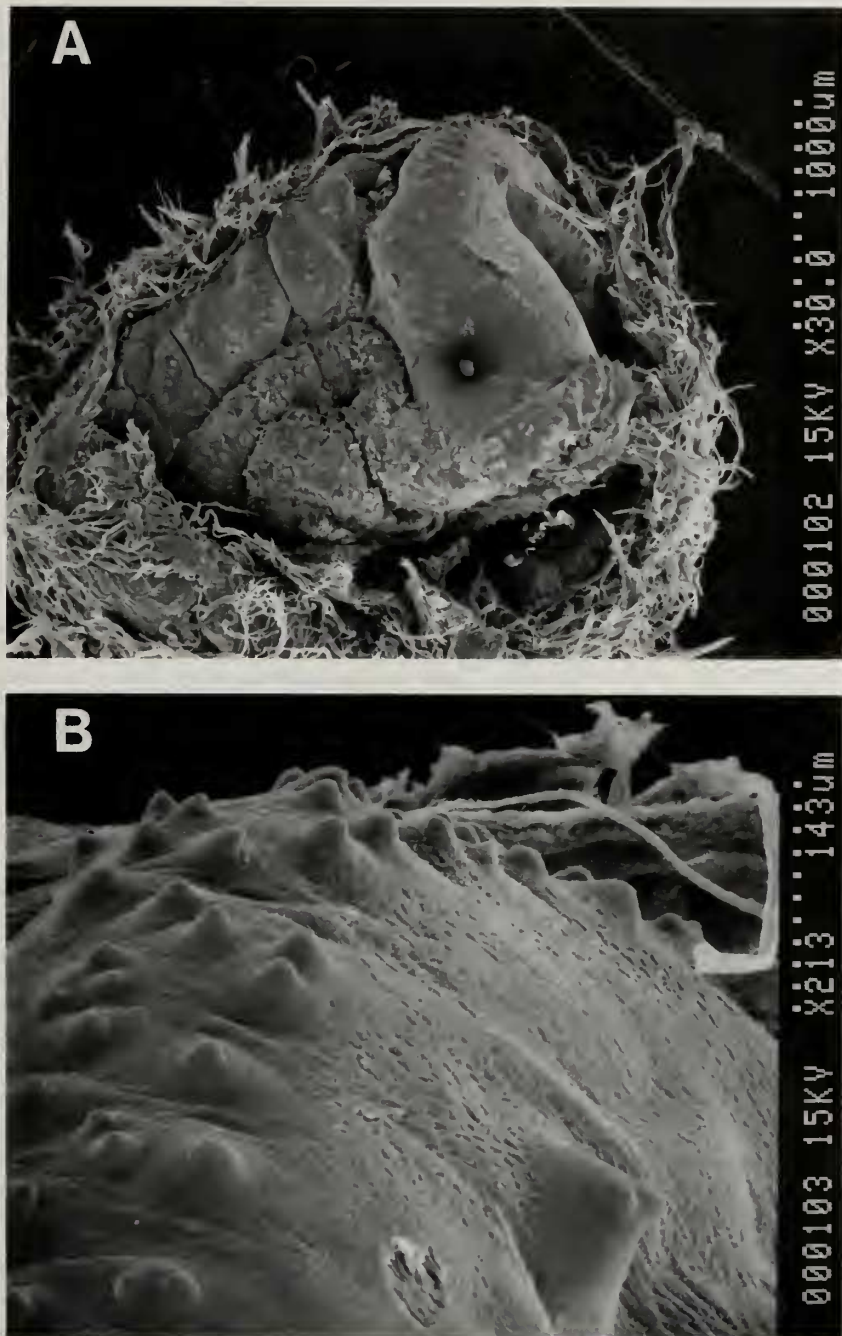


Figure 13

Pteraeolidia ianthina (Angas, 1864). Scanning electron micrographs. A. Penis. B. Detail of penial papillae.

Egg mass: The egg mass is salmon colored and highly convoluted. It is attached to the hydroid substrate along its edge, by means of a thin, transparent membrane. The mass, which is tightly packed with eggs arranged singly per capsule, is about 15 mm in length (Figure 11B).

Natural history: This species has been found exclusively upon athecate hydroids of the genus *Eudendrium*. The material from Bahía de los Angeles was collected on colonies of *E. ramosum* (Linnaeus, 1758). Specimens have been collected in shallow subtidal communities from the

Gulf of California (Bahía de los Angeles) and from the Pacific coast of Panama.

Systematic Placement of *Bajaeolis bertschi*

Bajaeolis bertschi bears similarities to members of several genera of aeolidaceans (Table 2). The uniseriate radula with cuspidate teeth, the cleioproct anus, and the nephroproct situated within the interhepatic space are characteristics of the Facelinidae. All the ceratal clusters are arranged in arches, as in members of the Favorininae. *Bajaeolis* has a double row of cerata forming each ceratal arch. This feature is exhibited by members of several genera of the Favorininae (MILLER, 1974). Of the Favorininae that have been previously described, only *Facalana pallida* Bergh, 1888, the type species of a monotypic genus, has perfoliate rhinophores, as in *Bajaeolis*. However, *F. pallida* has jaws similar in shape to those found in *Glaucus*, and there is only a single row of denticles along the masticatory border, as compared to the several rows present in *Bajaeolis*. In *Facalana* the penis is flattened and bears a row of glands along its perimeter, while in *Bajaeolis* it is simple and conical.

The only other genus within the Favorininae that has multiple rows of denticles along the masticatory border is *Favorinus*. However, *Favorinus* lacks oral glands (present study), while *Bajaeolis* is unique among described Favorininae in having dendritic oral glands. In *Favorinus* the ceratal arches contain only a single row while they are double in *Bajaeolis*.

Like *Bajaeolis*, *Pteraeolidia* possesses perfoliate rhinophores and jaws with several rows of denticles along the masticatory border. The familial placement of *Pteraeolidia* has been in dispute. MILLER (1974) suggested that *Pteraeolidia* should be included in the Glaucidae (Glaucidae + Facelinidae + Pteraeolididae of previous workers) whereas GOSLINER (1980) maintained that the external morphology and ecology of *Pteraeolidia* and *Glaucus* were sufficiently aberrant and that both genera should be placed in distinct families. RUDMAN (1982) stated that *Pteraeolidia* should be included in the Glaucidae because classification should reflect phylogeny, not ecology. Although classification certainly should reflect phylogeny, placement of organisms with derived traits in distinct taxa in no way contradicts a monophyletic classification. The acleioproct aeolid families Eubranchidae and Tergipedidae (=Cuthonidae) are phylogenetically closely allied (probably sister groups), yet tergipedids are considered distinct from eubranchids because they have a derived feature, a uniseriate rather than triseriate radula. The same situation applies to the Facelinidae, Glaucidae, and Pteraeolididae. Furthermore, in *Pteraeolidia* the nephroproct is adjacent to the anus in the second ceratal arch (BABA, 1949; FRANC, 1968; present study) while in all facelinids where it has been described the nephroproct is situated more anteriorly, in the interhepatic space. In addition to the position of the nephroproct, there are several other

significant differences between *Bajaeolis* and *Pteraeolidia*. Although both taxa have several rows of denticles along the masticatory border, the border is short in *Pteraeolidia* (GOSLINER, 1980) and elongate in *Bajaeolis*. *Bajaeolis* has dendritic oral glands that extend into the dorsal portion of the body, well beyond the posterior limit of the buccal mass. In *Pteraeolidia* (present study) the oral glands are simple, ventral, and extend posteriorly only to about the middle of the jaws. *Pteraeolidia* was described (BERGH, 1875) as having a simple unarmed penis. Re-examination of specimens in this study (Figures 12, 13) indicates that the penis is flattened, with numerous conical papillae on its surface. This contrasts markedly with the simple conical penis of *Bajaeolis*.

Bajaeolis differs significantly from all described aeolidaceans. No previously described member of the Favorininae is known to possess dendritic oral glands. The presence of perfoliate rhinophores, a masticatory border of the jaw with several rows of denticles, ceratal arches with two rows of cerata, and a simple conical penis differentiates *Bajaeolis* as a distinct genus.

Externally, this species bears a similarity in its coloration and body form to the sympatric aeolid *Flabellina stohleri* Bertsch & Ferreira, 1974. However, *F. stohleri* has a pleuroproct anus, a triseriate radula, and fewer cerata per cluster. Additionally the white surface of *F. stohleri* is in the form of closely set spots rather than specks, and purple bands are absent from the rhinophores and oral tentacles.

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